REMARKS/ARGUMENTS

Reconsideration and continued examination of the above-identified application are respectfully requested.

By way of this amendment, claims 2, 18, 23, 28, 37, 53, 58, 63, 89, and 90-94 have been amended to recite that the uniform grain size after extrusion and the average grain size of about 150 microns or less are throughout the cross section of the extruded billet. In other words, this uniform grain size and average grain size are present throughout the extruded billet. Support for this amendment can be found, for instance, at page 5, beginning at line 21, of the present application, which refers to the billet having a uniform grain size throughout the diameter and length of the billet which is further discussed at page 6 of the present application. Furthermore, this amendment simply adds clarity to the claims and does not raise any new questions that require further searching, nor does the amendment raise any new issues of patentability. Furthermore, the amendment places the application in condition for allowance or, at the very least, in a better condition for appeal. Also, in the interview held with Examiner Zheng, this amendment was discussed, and the Examiner agreed that this amendment would be entered by way of this Amendment After Final.

Accordingly, entry of this amendment is respectfully requested.

Summary of Interview

Dr. John Koenitzer, Craig Carpenter, and the undersigned wish to thank Examiner Zheng for the interview regarding this application held on June 10, 2008. In the interview, the differences between the pending claims and the cited references were discussed, including the manner in which the material is prepared in the cited references and the lack of teaching or suggestion regarding

uniform grain size throughout the billet, as well as other properties recited in the claims.

Rejection of Claims 2, 4-8, 12, 18-21, 23-26, 71-79, 89-91, 95, and 98-99 under 35 U.S.C. §103(a) over Clark et al. and WO 87/07650 (WO '650) in further view of Friedman et al.

At page 2 of the final Office Action, claims 2, 4-8, 12, 18-21, 23-26, 71-79, 89-91, 95 and 98-99 were rejected under 35 U.S.C. §103(a) as being obvious over Clark et al. and WO '650 in further view of Friedman et al. (U.S. Patent No. 5,482,672). The Examiner referred to the previous Office Actions wherein the Examiner alleged that Clark et al. teaches an extruded tantalum billet having a substantially uniform grain size. The Examiner acknowledged that Clark et al. does not explicitly teach the claimed purity, the metal in the article, the sputtering target or resistive film layer, but alleged that WO '650 teaches the purity claimed in claims 2, 7, and 12 and the metal in a sputtering target and a resistive film layer. This rejection is respectfully traversed.

In the response to arguments section of the Final Office Action, beginning at the top of page 5 of the Office Action, the Examiner took the position that the extrusion in Clark et al. could be converted to extrude a cylindrical bar shape product and further relied on Friedman et al. for this argument. The Examiner further argued that the size and shape of the billet depends upon the application of the final metal product and, therefore, the dimensions of the extruded billet are controlled by this. Further, the Examiner asserted that the significance of the diameter of the starting billet has not been shown.

Regarding the comparison of commercially-made billets with the present invention as set forth in the Examples, the Examiner asserts that the commercial products are within the claimed invention.

The applicants will respond to the Examiner's positions below.

As discussed in the interview held with the Examiner on June 10, 2008, one process of Clark et al. relates to extruding an ingot to a "rolling bar," which is shown to be a rectangular plate in Clark et al. It is noted that Clark et al. further requires that upon extruding to a rectangular plate that the material then be annealed and then rolled parallel to the ingot center line and then rolled perpendicular to the ingot center line. See Figs. 2 and 3 of Clark et al. As explained in the interview, the parallel and perpendicular rolling described by Clark et al. would not be possible if the material was a cylindrical billet as described in the present application. Thus, the Examiner's position that the process of Clark et al. could be converted to form an extruded billet instead of a rectangular plate would not be possible, since Clark et al. further requires that the material then be subjected to parallel rolling and perpendicular rolling and, as discussed in the interview, this would not be possible with a cylindrical object like a billet. To further support this point, a Declaration under 37 C.F.R. §1.132 by an employee of Cabot Corporation having knowledge in this area is submitted with this response. As stated in the Declaration, the additional steps of Clark et al. requiring parallel rolling and perpendicular rolling simply would not be feasible, since the rolling of a rod or cylindrical billet would not be controllable and either the rod simply would not be pinched through the rollers to deform the rod or the rod would uncontrollably go through the rollers and form a type of "corkscrew" through the rollers; thus, not forming the desired flattened material required by Clark et al.

With respect to the Examiner's comments that the size and shape of the extruded billet is based upon the application of the final metal product, the applicants cannot fully agree with the Examiner's position. An extruded billet, which is generally an intermediate product, can have a variety of shapes and sizes because the billet can be subdivided into various lengths for further

processing and, therefore, the size and shape of the extruded billet is not entirely dependent on the final metal product as proposed by the Examiner. In fact, this is shown by Clark et al., which uses a significantly smaller cylindrical object to form into a rectangular bar and, ultimately, into a rectangular plate. These same dimensions formed in Clark et al. can be made from the larger sized extruded billet of the present invention, wherein multiple plates are formed. Therefore, the beginning size and shape of the billet is not strictly size-dependent on the final product.

With regard to the significance of the diameter of the starting billet, the applicants, in the interview, directed the Examiner's attention to page 19, lines 8-20 of the present application, which provided evidence that a larger diameter billet had equal or finer average grain size and similar grain size uniformity, which showed that a larger sized ingot diameter permits a greater amount of stored energy to be parted into the extruded billet.

With regard to the Examiner's assertion that the experimental data in the present application is not commensurate with the scope of the claims, the applicants respectfully disagree. As explained in the interview, Figs. 2(A) and 2(B) are actually part of the same table, but divided into two figures in order to fit on the page. For each sample, there are two entries in the figures, a center sample location, and an edge sample location. The center and edge locations are from the same billet. As can be seen, the process which used the "commercial process" in Figs. 2(A)-(B) does not fall within the claimed invention because the center location exhibited grain sizes ranging from 20-245 microns, which was a deviation of more than 100 microns from the average grain size of 60 microns, which is outside of what is defined as a "substantially uniform grain size." See the bottom of page 5 and top of page 6 of the present application. Furthermore, the recrystallization of the center sample location of the commercial process was 76%, again, outside of the claimed invention. Thus, the commercial process is not within the

scope of the claims of the present invention, and the Examiner acknowledged this point in the interview upon providing this explanation.

Furthermore, the examples of the present application in Figs. 2(A)-(B) are commensurate with the scope of the invention as explained in the Examiner's interview based on the recrystallization percent and average grain size, as well as the low deviation of the grain size range.

With respect to the Examiner's assertion that the initial ingot diameter used in the commercial process was 12 inches and the final rod diameter was 3.75 inches, which is a different comparison from the present invention which involved an ingot size of 10 inches and a diameter of 4 inches, the applicants explained during the interview that this difference was not significant. In particular, Fig. 1 of the present application provides a comparison of the "commercial process" with the "extrusion process" of the present invention. As can be seen, the commercial process did form a billet having a diameter of 4 inches (see "Rotary Forge 4" "). Due to machine cleaning, this is why the diameter became 3.75 inches. The extrusion process, as can be seen, formed a 4 inch diameter billet as well. With respect to the starting ingot, as indicated above, using a 12 inch diameter ingot for the commercial process would actually provide more beneficial properties for the billet of the "commercial process" since, as indicated above, the larger size ingot resulted in equal or finer grain size as mentioned at page 19, lines 15-20 of the present application. Due to the initially larger diameter ingot size for the "commercial process" and since the ingot was reduced to the same diameter billet, this actually permitted more "work" into the billet, which would have resulted in more beneficial grain properties and uniformity. As can be seen, even with this more favorable larger starting ingot diameter, the commercial process did not provide better properties than the process of the present invention. Thus, contrary to the

Examiner's position, the comparison was actually more favorable to the "commercial process" than to the present invention and, yet the present invention still achieved better results.

For these reasons, this rejection should be withdrawn.

Rejection of Claims 22 and 27-35 under 35 U.S.C. §103(a) -- Clark et al. in view of WO '650, Friedman et al. and Wittenauer et al.

At page 3 of the final Office Action, the Examiner rejects claims 22 and 27-35 under 35 U.S.C. §103(a) as being unpatentable over Clark et al. in view of WO '650 and Friedman et al. and further in view of Wittenauer et al. (U.S. Patent No. 5,121,535). The Examiner essentially relies on Clark et al., WO '650, and Friedman et al. as described previously. The Examiner relies on Witttenauer et al. to assert that it would be obvious to use a protective coating on a metal work piece prior to hot working. This rejection is respectfully traversed.

The deficiencies of Clark et al., Friedman et al., and WO '650 discussed above and in previous responses apply equally here. Furthermore, it is noted that Wittenauer et al. specifically relates to processes involving "thin sections of refractory metals." The claims of the present application do not relate to thin sections of metal and, in fact, are the complete opposite. The present invention specifically relates to large cylindrical objects having a diameter of at least 3 1/2 inches and a L/D ratio of greater than 0.5. One skilled in the art would not look to Wittenauer et al., as proposed by the Examiner, to apply such a process to Clark et al. for the reasons previously provided and further because the Examiner is proposing that Clark et al. is being modified to make large extruded cylindrical billets as recited in the present application, and if this is the basis for the rejection, then one would not look to Wittenauer et al., which strictly relates to forming thin metal sections of reactive metals. In fact, at col. 5, beginning at line 38, Wittenauer et al. states various thickness ranges, such as 100 micrometers to about 10,000

micrometers, and describes the finished material as foil. This is radically different from the teachings of Clark et al. as stated in Clark et al. and as even modified by the Examiner for purposes of this rejection.

Accordingly, for these reasons, this rejection should be withdrawn.

Rejection of Claims 37-43, 47-48, 53-56, 58-61, 80-88, 92-94, and 100-101 under 35 U.S.C. §103(a) over Clark et al. in view of Friedman et al. and in further view of JP '180

At page 3 of the final Office Action, claims 37-43, 47-48, 53-56, 58-61, 80-88, 92-94, and 100-101 were rejected under 35 U.S.C. §103(a) as being obvious over Clark et al. in view of Friedman et al. and in further view of JP 362104180 A (JP '180). The Examiner referred to the rejection grounds given in paragraph 7 of the Office Action dated May 3, 2007.

The Examiner alleged that although Clark et al.'s teaching is directed to tantalum, one of ordinary skill in the art would have found the claimed extruded niobium billet obvious on the alleged grounds that tantalum and niobium belong to the same group of metals in the Periodic Table and exhibit very similar properties. This rejection is respectfully traversed.

The Examiner has not shown that the teachings of Clark et al. regarding tantalum have any relevance to niobium. Even if the teachings of Clark et al. could be carried over to niobium, the combined references do not teach or suggest the claimed invention for the reasons given above and previously. JP '180 does not teach or show any of the deficiencies noted above, and the Examiner has not proposed that JP '180 does teach or suggest any of the omissions indicated above.

Furthermore, in the Amendment filed February 8, 2007, this rejection has been addressed and the arguments are incorporated in their entirety by reference herein.

For these reasons, this rejection should be withdrawn.

Rejection of Claims 57 and 62-70 under 35 U.S.C. §103(a) – Clark et al. in view of Friedman et al. and JP '180 and further in view of Wittenauer

At page 3 of the final Office Action, the Examiner rejects claims 57 and 62-70 under 35 U.S.C. §103(a) as being unpatentable over Clark et al. in view of Friedman et al. and JP '180 and further in view of Wittenauer. Essentially, the Examiner is relying upon the same arguments set forth above with respect to each of these references. This rejection is respectfully traversed.

As stated above, Wittenauer et al. would not be combinable with Clark et al. and the other cited references. The above reasons are incorporated herein in their entirety.

Accordingly, this rejection should be withdrawn.

Rejection of Claims 2, 4-8, 12, 18-21, 23-26, 71-79, 89-91, 95, and 98-99 under 35 U.S.C. §103(a) as being unpatentable over Turner and further in view of Friedman et al.

At page 4 of the final Office Action, the Examiner rejects claims 2, 4-8, 12, 18-21, 23-26, 71-79, 89-91, 95, and 98-99 under 35 U.S.C. §103(a) as being unpatentable over Turner (U.S. Patent No. 6,331,223) and further in view of Friedman et al. The Examiner asserts that Turner shows a method for producing high purity tantalum product having a uniform texture and mean grain size of less than 100 microns. The Examiner further asserts that Turner teaches that the starting tantalum preform is an electron beam melting ingot. The Examiner relies upon Friedman et al. as in the above rejections and asserts that it would be obvious to use extrusions steps in Turner to make cylindrical shaped objects. The Examiner again asserts that various parameters set forth in the claims are not shown in Turner or Friedman, but concludes that these would be obvious without any technical foundation for making such a conclusion. This rejection is

respectfully traversed.

As explained in the interview, with respect to Turner, Turner does not teach or suggest any type of particular deformation of metal except mentioning in general that deformation can be forging, rolling, or extrusion. However, Turner does not teach or suggest where any extrusion should occur, meaning in the first deformation, second deformation or third deformation, since Turner requires three deformations as shown in the examples of Turner. In addition, during the interview, the Examiner's attention was drawn to Fig. 3 of Turner, which showed the process of Turner and it is clearly seen that a cylindrical ingot is started with, but then every step afterwards, it is in the shape of a rectangular object as in the Clark et al. Thus, Turner actually is no different than Clark et al. with respect to taking a cylindrical object and then forming a rectangular plate. Thus, for the same reasons, one skilled in the art would not combine Friedman et al. with Clark et al., since Friedman et al. maintains an extruded bar, whereas Turner forms a rectangular object in a similar manner to Clark et al. In addition, as further indicated in the interview, any reference to low grain size is with respect to the final product and not to the intermediate product. In fact, as shown in Fig. 3 of Turner, none of the material of Turner is shown as a cylindrical intermediate product and, further, none of the information in Turner measures or provides information regarding the uniformity of grain size throughout the intermediate product.

As explained in the interview, Fig. 3 of Turner shows three deformation steps which involve a large amount of strain put on the target over three deformations as shown in the table of Clark, which provides the amount of deformation percent. With the use of three deformations of greater than 40%, if not higher, a lot of work has been put into the final piece to provide this low mean grain size in the final product of Turner. Unlike Turner, the present invention actually achieves a very uniform grain size throughout the billet while forming a billet with a diameter of

at least 3-1/2 inches, which is significantly more than the sputtering target formed by Turner, which has dimensions typically of 0.5 inch or less. Thus, the present invention actually achieves excellent properties for an intermediate product, even though the intermediate product has dimensions of 3-1/2 inches and above with respect to diameter and is a billet as opposed to a final shaped sputtering target with much lower dimensions.

For these reasons, Turner does not teach or suggest the claimed invention alone or in view of Friedman et al., and this rejection should be withdrawn.

Rejection of Claims 22, 27-35, 57, and 62-70 under 35 U.S.C. §103(a) -- Turner in view of Friedman et al. and further in view of Wittenauer et al.

At page 4 of the final Office Action, the Examiner rejects claims 22, 27-35, 57, and 62-70 under 35 U.S.C. §103(a) as being unpatentable over Turner in view of Friedman et al. and further in view of Wittenauer et al. Essentially, the Examiner relies on Turner and Friedman et al. and Wittenauer et al. as described above. This rejection is respectfully traversed.

For the reasons provided above with respect to Turner in view of Friedman et al., this rejection should be withdrawn. Wittenauer et al. does not overcome any of these deficiencies. Furthermore, the deficiencies of Wittenauer et al., as described above with respect to the Examiner's reliance on Clark et al., Friedman et al., and Wittenauer et al. apply equally here in this rejection. One skilled in the art simply would not modify Turner in view of Wittenauer et al. and Friedman et al. as proposed by the Examiner as stated above.

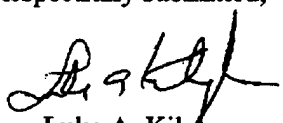
Accordingly, for these same reasons, this rejection should be withdrawn as well.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully request the reconsideration of this application and the timely allowance of the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,



Luke A. Kilyk
Reg. No. 33,251

Atty. Docket No. CPM00029CIP (3600-328-01)
KILYK & BOWERSOX, P.L.L.C.
400 Holiday Court, Suite 102
Warrenton, VA 20186
Tel: (540) 428-1701
Fax.: (540) 428-1720
Attachment: Declaration under 37 C.F.R. §1.132 (4 pages)